



Analytical Laboratory

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Huntersville, NC 28078-7929
McGuire Nuclear Complex - MG03A2
Phone: 980-875-5245 Fax: 980-875-4349

Order Summary Report

Order Number: J13080507

Project Name: WWTS FGD-Routine 2013

Customer Name(s): Bill Kennedy, Wayne Chapman, Melonie Martin

Customer Address: 3195 Pine Hall Rd
Mailcode: Belews Steam Station
Belews Creek, NC 28012

Lab Contact: Jason C Perkins Phone: 980-875-5348

Report Authorized By: _____ **Date:** 9/17/2013
(Signature) Jason C Perkins

Program Comments:

Please contact the Program Manager (Jason C Perkins) with any questions regarding this report.

Data Flags & Calculations:

Any analytical tests or individual analytes within a test flagged with a Qualifier indicate a deviation from the method quality system or quality control requirement. The qualifier description is found at the end of the Certificate of Analysis (sample results) under the qualifiers heading. All results are reported on a dry weight basis unless otherwise noted. Subcontracted data included on the Duke Certificate of Analysis is to be used as information only. Certified vendor results can be found in the subcontracted lab final report. Duke Energy Analytical Laboratory subcontracts analyses to other vendor laboratories that have been qualified by Duke Energy to perform these analyses except where noted.

Data Package:

This data package includes analytical results that are applicable only to the samples described in this narrative. An estimation of the uncertainty of measurement for the results in the report is available upon request. This report shall not be reproduced, except in full, without the written consent of the Analytical Laboratory. Please contact the Analytical laboratory with any questions. The order of individual sections within this report is as follows:

Job Summary Report, Sample Identification, Technical Validation of Data Package, Analytical Laboratory Certificate of Analysis, Analytical Laboratory QC Reports, Sub-contracted Laboratory Results, Customer Specific Data Sheets, Reports & Documentation, Customer Database Entries, Test Case Narratives, Chain of Custody (COC)

Certification:

The Analytical Laboratory holds the following State Certifications : North Carolina (DENR) Certificate #248, South Carolina (DHEC) Laboratory ID # 99005. Contact the Analytical Laboratory for definitive information about the certification status of specific methods.

Sample ID's & Descriptions:

| Sample ID | Plant/Station | Collection Date and Time | Collected By | Sample Description |
|-----------------|---------------|-----------------------------|--------------|--------------------|
| 2013020586 | BELEWS | 27-Aug-13 7:40 AM | TO | FGD Purge Eff |
| 2013020587 | BELEWS | 27-Aug-13 7:45 AM | TO | EQ Tank Eff |
| 2013020588 | BELEWS | 27-Aug-13 7:50 AM | TO | BioReactor 1 Inf |
| 2013020589 | BELEWS | 27-Aug-13 8:00 AM | TO | BioReactor 2 Inf |
| 2013020590 | BELEWS | 27-Aug-13 8:05 AM | TO | BioReactor 2 Eff |
| 2013020591 | BELEWS | 27-Aug-13 7:55 AM | TO | Filter Blk |
| 2013020592 | BELEWS | 27-Aug-13 7:35 AM | TO | TRIP BLANK |
| 7 Total Samples | | | | |

Technical Validation Review

Checklist:

COC and .pdf report are in agreement with sample totals and analyses (compliance programs and procedures).

☒ Yes☐ No

All Results are less than the laboratory reporting limits.

☐ Yes☒ No

All laboratory QA/QC requirements are acceptable.

☒ Yes☐ No

Report Sections Included:

☒ Job Summary Report☒ Sample Identification☒ Technical Validation of Data Package☒ Analytical Laboratory Certificate of Analysis☐ Analytical Laboratory QC Report☒ Sub-contracted Laboratory Results☐ Customer Specific Data Sheets, Reports, & Documentation☐ Customer Database Entries☒ Chain of Custody☒ Electronic Data Deliverable (EDD) Sent Separately

Reviewed By: DBA Account

Date: 9/17/2013

Certificate of Laboratory Analysis

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*This report shall not be reproduced, except in full.***Order # J13080507**

Site: FGD Purge Eff

Collection Date: 27-Aug-13 7:40 AM

Sample #: 2013020586

Matrix: OTHER

| Analyte | Result | Units | Qualifiers | RDL | DF | Method | Analysis Date/Time | Analyst |
|--|--------|-------|------------|-----|----|-----------|--------------------|---------|
| <u>INORGANIC IONS BY IC</u> | | | | | | | | |
| Bromide | 90 | mg/L | | 5 | 50 | EPA 300.0 | 08/30/2013 16:33 | BGN9034 |
| <u>MERCURY (COLD VAPOR) IN WATER</u> | | | | | | | | |
| Mercury (Hg) | < 2.5 | ug/L | | 2.5 | 50 | EPA 245.1 | 08/30/2013 09:43 | DKJOHN2 |
| <u>TOTAL RECOVERABLE METALS BY ICP</u> | | | | | | | | |
| Boron (B) | 185 | mg/L | | 0.5 | 10 | EPA 200.7 | 09/03/2013 10:52 | MHH7131 |
| <u>DISSOLVED METALS BY ICP-MS</u> | | | | | | | | |
| Selenium (Se) | 186 | ug/L | | 10 | 10 | EPA 200.8 | 09/13/2013 12:54 | DJSULL1 |
| <u>TOTAL RECOVERABLE METALS BY ICP-MS</u> | | | | | | | | |
| Arsenic (As) | 606 | ug/L | | 10 | 10 | EPA 200.8 | 09/12/2013 12:15 | DJSULL1 |
| Cadmium (Cd) | < 10 | ug/L | | 10 | 10 | EPA 200.8 | 09/12/2013 12:15 | DJSULL1 |
| Chromium (Cr) | 490 | ug/L | | 10 | 10 | EPA 200.8 | 09/12/2013 12:15 | DJSULL1 |
| Copper (Cu) | 344 | ug/L | | 10 | 10 | EPA 200.8 | 09/12/2013 12:15 | DJSULL1 |
| Nickel (Ni) | 397 | ug/L | | 10 | 10 | EPA 200.8 | 09/12/2013 12:15 | DJSULL1 |
| Selenium (Se) | 8450 | ug/L | | 20 | 20 | EPA 200.8 | 09/12/2013 12:15 | DJSULL1 |
| Silver (Ag) | < 10 | ug/L | | 10 | 10 | EPA 200.8 | 09/12/2013 12:15 | DJSULL1 |
| Zinc (Zn) | 539 | ug/L | | 10 | 10 | EPA 200.8 | 09/12/2013 12:15 | DJSULL1 |

SELENIUM SPECIATION - (Analysis Performed by Applied Speciation and Consulting, LLC)

| | | | |
|------------------|----------|---------------|--------|
| Vendor Parameter | Complete | Vendor Method | V_AS&C |
|------------------|----------|---------------|--------|

Site: EQ Tank Eff

Collection Date: 27-Aug-13 7:45 AM

Sample #: 2013020587

Matrix: OTHER

| Analyte | Result | Units | Qualifiers | RDL | DF | Method | Analysis Date/Time | Analyst |
|---|--------|-------|------------|-----|----|-----------|--------------------|---------|
| <u>MERCURY (COLD VAPOR) IN WATER</u> | | | | | | | | |
| Mercury (Hg) | < 2.5 | ug/L | | 2.5 | 50 | EPA 245.1 | 08/30/2013 09:45 | DKJOHN2 |
| <u>TOTAL RECOVERABLE METALS BY ICP</u> | | | | | | | | |
| Boron (B) | 184 | mg/L | | 0.5 | 10 | EPA 200.7 | 09/03/2013 10:56 | MHH7131 |
| <u>DISSOLVED METALS BY ICP-MS</u> | | | | | | | | |
| Selenium (Se) | 98.4 | ug/L | | 10 | 10 | EPA 200.8 | 09/13/2013 12:58 | DJSULL1 |

Certificate of Laboratory Analysis

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*This report shall not be reproduced, except in full.***Order # J13080507**

Site: EQ Tank Eff

Collection Date: 27-Aug-13 7:45 AM

Sample #: 2013020587

Matrix: OTHER

| Analyte | Result | Units | Qualifiers | RDL | DF | Method | Analysis Date/Time | Analyst |
|--|----------------|-------|------------|-----|----|-----------|--------------------|---------|
| <u>TOTAL RECOVERABLE METALS BY ICP-MS</u> | | | | | | | | |
| Arsenic (As) | 181 | ug/L | | 10 | 10 | EPA 200.8 | 09/12/2013 12:28 | DJSULL1 |
| Cadmium (Cd) | < 10 | ug/L | | 10 | 10 | EPA 200.8 | 09/12/2013 12:28 | DJSULL1 |
| Chromium (Cr) | 194 | ug/L | | 10 | 10 | EPA 200.8 | 09/12/2013 12:28 | DJSULL1 |
| Copper (Cu) | 103 | ug/L | | 10 | 10 | EPA 200.8 | 09/12/2013 12:28 | DJSULL1 |
| Nickel (Ni) | 174 | ug/L | | 10 | 10 | EPA 200.8 | 09/12/2013 12:28 | DJSULL1 |
| Selenium (Se) | 2570 | ug/L | | 10 | 10 | EPA 200.8 | 09/12/2013 12:28 | DJSULL1 |
| Silver (Ag) | < 10 | ug/L | | 10 | 10 | EPA 200.8 | 09/12/2013 12:28 | DJSULL1 |
| Zinc (Zn) | 167 | ug/L | | 10 | 10 | EPA 200.8 | 09/12/2013 12:28 | DJSULL1 |

Site: BioReactor 1 Inf

Collection Date: 27-Aug-13 7:50 AM

Sample #: 2013020588

Matrix: OTHER

| Analyte | Result | Units | Qualifiers | RDL | DF | Method | Analysis Date/Time | Analyst |
|---|-----------------|-------|------------|-----|----|---------------|--------------------|---------|
| <u>Mercury by EPA 200.8 - (Analysis Performed by Applied Speciation and Consulting, LLC)</u> | | | | | | | | |
| Vendor Parameter | Complete | ug/l | | | | Vendor Method | | V_AS&C |
| <u>TOTAL RECOVERABLE METALS BY ICP</u> | | | | | | | | |
| Boron (B) | 187 | mg/L | | 0.5 | 10 | EPA 200.7 | 09/03/2013 11:00 | MHH7131 |
| <u>DISSOLVED METALS BY ICP-MS</u> | | | | | | | | |
| Selenium (Se) | 98.7 | ug/L | | 10 | 10 | EPA 200.8 | 09/13/2013 13:01 | DJSULL1 |
| <u>TOTAL RECOVERABLE METALS BY ICP-MS</u> | | | | | | | | |
| Arsenic (As) | < 10 | ug/L | | 10 | 10 | EPA 200.8 | 09/12/2013 12:31 | DJSULL1 |
| Cadmium (Cd) | < 10 | ug/L | | 10 | 10 | EPA 200.8 | 09/12/2013 12:31 | DJSULL1 |
| Chromium (Cr) | < 10 | ug/L | | 10 | 10 | EPA 200.8 | 09/12/2013 12:31 | DJSULL1 |
| Copper (Cu) | < 10 | ug/L | | 10 | 10 | EPA 200.8 | 09/12/2013 12:31 | DJSULL1 |
| Nickel (Ni) | 10.1 | ug/L | | 10 | 10 | EPA 200.8 | 09/12/2013 12:31 | DJSULL1 |
| Selenium (Se) | 80.8 | ug/L | | 10 | 10 | EPA 200.8 | 09/12/2013 12:31 | DJSULL1 |
| Silver (Ag) | < 10 | ug/L | | 10 | 10 | EPA 200.8 | 09/12/2013 12:31 | DJSULL1 |
| Zinc (Zn) | < 10 | ug/L | | 10 | 10 | EPA 200.8 | 09/12/2013 12:31 | DJSULL1 |
| <u>SELENIUM SPECIATION - (Analysis Performed by Applied Speciation and Consulting, LLC)</u> | | | | | | | | |
| Vendor Parameter | Complete | | | | | Vendor Method | | V_AS&C |

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*This report shall not be reproduced, except in full.***Order # J13080507**

Site: BioReactor 2 Inf

Collection Date: 27-Aug-13 8:00 AM

Sample #: 2013020589

Matrix: OTHER

| Analyte | Result | Units | Qualifiers | RDL | DF | Method | Analysis Date/Time | Analyst |
|---|----------|-------|------------|-----|----|---------------|--------------------|---------|
| <u>Mercury by EPA 200.8 - (Analysis Performed by Applied Speciation and Consulting, LLC)</u> | | | | | | | | |
| Vendor Parameter | Complete | ug/l | | | | Vendor Method | | V_AS&C |
| <u>TOTAL RECOVERABLE METALS BY ICP</u> | | | | | | | | |
| Boron (B) | 193 | mg/L | | 0.5 | 10 | EPA 200.7 | 09/03/2013 11:04 | MHH7131 |
| <u>TOTAL RECOVERABLE METALS BY ICP-MS</u> | | | | | | | | |
| Arsenic (As) | < 10 | ug/L | | 10 | 10 | EPA 200.8 | 09/12/2013 12:35 | DJSULL1 |
| Cadmium (Cd) | < 10 | ug/L | | 10 | 10 | EPA 200.8 | 09/12/2013 12:35 | DJSULL1 |
| Chromium (Cr) | < 10 | ug/L | | 10 | 10 | EPA 200.8 | 09/12/2013 12:35 | DJSULL1 |
| Copper (Cu) | < 10 | ug/L | | 10 | 10 | EPA 200.8 | 09/12/2013 12:35 | DJSULL1 |
| Nickel (Ni) | < 10 | ug/L | | 10 | 10 | EPA 200.8 | 09/12/2013 12:35 | DJSULL1 |
| Selenium (Se) | < 10 | ug/L | | 10 | 10 | EPA 200.8 | 09/12/2013 12:35 | DJSULL1 |
| Silver (Ag) | < 10 | ug/L | | 10 | 10 | EPA 200.8 | 09/12/2013 12:35 | DJSULL1 |
| Zinc (Zn) | < 10 | ug/L | | 10 | 10 | EPA 200.8 | 09/12/2013 12:35 | DJSULL1 |

Site: BioReactor 2 Eff

Collection Date: 27-Aug-13 8:05 AM

Sample #: 2013020590

Matrix: OTHER

| Analyte | Result | Units | Qualifiers | RDL | DF | Method | Analysis Date/Time | Analyst |
|---|----------|-------|------------|-----|----|---------------|--------------------|---------|
| <u>INORGANIC IONS BY IC</u> | | | | | | | | |
| Bromide | 100 | mg/L | | 5 | 50 | EPA 300.0 | 08/30/2013 16:52 | BGN9034 |
| <u>Mercury by EPA 200.8 - (Analysis Performed by Applied Speciation and Consulting, LLC)</u> | | | | | | | | |
| Vendor Parameter | Complete | ug/l | | | | Vendor Method | | V_AS&C |
| <u>TOTAL RECOVERABLE METALS BY ICP</u> | | | | | | | | |
| Boron (B) | 199 | mg/L | | 0.5 | 10 | EPA 200.7 | 09/03/2013 11:08 | MHH7131 |
| <u>TOTAL RECOVERABLE METALS BY ICP-MS</u> | | | | | | | | |
| Arsenic (As) | < 5 | ug/L | | 5 | 5 | EPA 200.8 | 09/12/2013 12:38 | DJSULL1 |
| Cadmium (Cd) | < 5 | ug/L | | 5 | 5 | EPA 200.8 | 09/12/2013 12:38 | DJSULL1 |
| Chromium (Cr) | < 5 | ug/L | | 5 | 5 | EPA 200.8 | 09/12/2013 12:38 | DJSULL1 |
| Copper (Cu) | < 5 | ug/L | | 5 | 5 | EPA 200.8 | 09/12/2013 12:38 | DJSULL1 |
| Nickel (Ni) | < 5 | ug/L | | 5 | 5 | EPA 200.8 | 09/12/2013 12:38 | DJSULL1 |
| Selenium (Se) | 5.44 | ug/L | | 5 | 5 | EPA 200.8 | 09/12/2013 12:38 | DJSULL1 |
| Silver (Ag) | < 5 | ug/L | | 5 | 5 | EPA 200.8 | 09/12/2013 12:38 | DJSULL1 |
| Zinc (Zn) | < 5 | ug/L | | 5 | 5 | EPA 200.8 | 09/12/2013 12:38 | DJSULL1 |
| <u>SELENIUM SPECIATION - (Analysis Performed by Applied Speciation and Consulting, LLC)</u> | | | | | | | | |
| Vendor Parameter | Complete | | | | | Vendor Method | | V_AS&C |

Certificate of Laboratory Analysis

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Site: BioReactor 2 Eff

Collection Date: 27-Aug-13 8:05 AM

Sample #: 2013020590

Matrix: OTHER

| Analyte | Result | Units | Qualifiers | RDL | DF | Method | Analysis Date/Time | Analyst |
|--------------------------------------|--------------|-------|------------|-----|----|---------|--------------------|---------|
| <u>TOTAL DISSOLVED SOLIDS</u> | | | | | | | | |
| TDS | 17000 | mg/L | | 100 | 1 | SM2540C | 08/29/2013 15:00 | |

Site: Filter Blk

Collection Date: 27-Aug-13 7:55 AM

Sample #: 2013020591

Matrix: OTHER

| Analyte | Result | Units | Qualifiers | RDL | DF | Method | Analysis Date/Time | Analyst |
|--|-------------|-------|------------|-----|----|-----------|--------------------|---------|
| <u>DISSOLVED METALS BY ICP-MS</u> | | | | | | | | |
| Selenium (Se) | 1.58 | ug/L | | 1 | 1 | EPA 200.8 | 09/13/2013 12:40 | DJSULL1 |

Site: TRIP BLANK

Collection Date: 27-Aug-13 7:35 AM

Sample #: 2013020592

Matrix: OTHER

| Analyte | Result | Units | Qualifiers | RDL | DF | Method | Analysis Date/Time | Analyst |
|--|------------------|-------|------------|------|----|-----------|--------------------|---------|
| <u>TOTAL RECOVERABLE METALS BY ICP</u> | | | | | | | | |
| Boron (B) | < 0.05 | mg/L | | 0.05 | 1 | EPA 200.7 | 09/03/2013 10:44 | MHH7131 |
| <u>TOTAL RECOVERABLE METALS BY ICP-MS</u> | | | | | | | | |
| Arsenic (As) | < 1 | ug/L | | 1 | 1 | EPA 200.8 | 09/12/2013 12:08 | DJSULL1 |
| Cadmium (Cd) | < 1 | ug/L | | 1 | 1 | EPA 200.8 | 09/12/2013 12:08 | DJSULL1 |
| Chromium (Cr) | < 1 | ug/L | | 1 | 1 | EPA 200.8 | 09/12/2013 12:08 | DJSULL1 |
| Copper (Cu) | < 1 | ug/L | | 1 | 1 | EPA 200.8 | 09/12/2013 12:08 | DJSULL1 |
| Nickel (Ni) | < 1 | ug/L | | 1 | 1 | EPA 200.8 | 09/12/2013 12:08 | DJSULL1 |
| Selenium (Se) | < 1 | ug/L | | 1 | 1 | EPA 200.8 | 09/12/2013 12:08 | DJSULL1 |
| Silver (Ag) | < 1 | ug/L | | 1 | 1 | EPA 200.8 | 09/12/2013 12:08 | DJSULL1 |
| Zinc (Zn) | < 1 | ug/L | | 1 | 1 | EPA 200.8 | 09/12/2013 12:08 | DJSULL1 |



**APPLIED SPECIATION
AND CONSULTING, LLC**

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Tel: (425) 483-3300 Fax: (425) 483-9818
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September 9, 2013

Jay Perkins
Duke Energy Analytical Laboratory
Mail Code MGO3A2 (Building 7405)
13339 Hagers Ferry Rd.
Huntersville, NC 28078
(704) 875-5245

Project: Belews – FGD WWTS (Flex Fuel Study)** (LIMS# J13080507)

Mr. Perkins,

Attached is the report associated with four (4) aqueous samples submitted for total mercury and selenium speciation analysis on August 28, 2013. The samples were received in a sealed cooler at -0.3°C on August 29, 2013. Selenium speciation analysis was performed via ion chromatography inductively coupled plasma collision reaction cell mass spectrometry (IC-ICP-CRC-MS). Mercury quantitation was performed via cold vapor inductively coupled plasma mass spectrometry (CV-ICP-MS). Any issues associated with the analysis are addressed in the following report.

If you have any questions, please feel free to contact me at your convenience.

Sincerely,

A handwritten signature in black ink, appearing to read "Russell Gerads", written over a light blue horizontal line.

Russell Gerads
Vice President
Applied Speciation and Consulting, LLC

Applied Speciation and Consulting, LLC

Report prepared for:

Jay Perkins
Duke Energy Analytical Laboratory
Mail Code MGO3A2 (Building 7405)
13339 Hagers Ferry Rd.
Huntersville, NC 28078

Project: Belews – FGD WWTS (Flex Fuel Study)** (LIMS# J13080507)

September 9, 2013

1. Sample Reception

Three (3) aqueous samples were submitted for selenium speciation analysis on August 28, 2013. Three (3) additional samples were submitted for total mercury quantitation. All samples were received in acceptable condition on August 29, 2013 in a sealed container at -0.3°C.

All samples were received in a laminar flow clean hood, void of trace metals contamination and ultra-violet radiation, and were designated discrete sample identifiers. The 40mL borosilicate glass vials submitted for total mercury were preserved with bromine monochloride (BrCl) solution. The resulting samples were stored in a secure polyethylene container, known to be free from trace metals contamination, until the analyses could be performed.

An aliquot of each sample requiring selenium speciation evaluation was filtered (0.45µm) and each filtrate was stored in a secure, monitored cryofreezer (maintained at a temperature of -80°C) until selenium speciation analysis could be performed via ion chromatography inductively coupled plasma collision reaction cell mass spectrometry (IC-ICP-CRC-MS).

2. Sample Preparation

All sample preparation is performed in laminar flow clean hoods known to be free from trace metals contamination. All applied water for dilutions and sample preservatives are monitored for contamination to account for any biases associated with the sample results.

Total Mercury Quantitation by CV-ICP-MS All samples and preparation blanks for total mercury quantitation were preserved with 2% (v/v) BrCl. The resulting samples were analyzed for mercury via cold vapor inductively coupled plasma mass spectrometry (CV-ICP-MS).

Selenium Speciation Analysis by IC-ICP-CRC-MS Prior to analysis, an aliquot of each sample was filtered with a syringe filter (0.45 μ m) and injected directly into a sealed autosampler vial. No further sample preparation was performed as any chemical alteration of a sample may shift the equilibrium of the system, resulting in changes in speciation ratios.

3. Sample Analysis

All sample analysis is preceded by a minimum of a five-point calibration curve spanning the entire concentration range of interest. Calibration curves are performed at the beginning of each analytical day. All calibration curves, associated with each species of interest, are standardized by linear regression resulting in a response factor. All sample results are **instrument blank corrected** to account for any operational biases associated with the analytical platform.

Prior to sample analysis, all calibration curves are verified using second source standards which are identified as initial calibration verification standards (ICV).

Ongoing instrument performance is identified by the analysis of continuing calibration verification standards (CCV) and continuing calibration blanks (CCB) at a minimum interval of every ten analytical runs.

Total Mercury Quantitation by CV-ICP-MS The sample fractions for total mercury quantitation were analyzed by cold vapor inductively coupled plasma mass spectrometry (CV-ICP-MS) on September 4, 2013. Aliquots of each sample are reacted with a reductant in-line and transported to a gas-liquid separator. The volatile elemental mercury that is formed is then swept by a stream of argon gas into a radio frequency (RF) plasma where energy-transfer processes cause desolvation, atomization, and ionization. The ions are extracted from the plasma through a differentially-pumped vacuum interface and separated on the basis of their mass-to-charge ratio (m/z) by a mass spectrometer. A solid-state detector detects ions transmitted through the mass analyzer and the resulting current is processed by a data handling system.

Selenium Speciation Analysis by IC-ICP-CRC-MS Each sample for selenium speciation analysis was analyzed by ion chromatography inductively coupled plasma collision reaction cell mass spectrometry (IC-ICP-CRC-MS) on August 30, 2013. An aliquot of each sample is injected onto an anion exchange column and mobilized by a basic ($\text{pH} > 7$) gradient. The eluting selenium species are then introduced into a radio frequency (RF) plasma where energy-transfer processes cause desolvation, atomization, and ionization. The ions are extracted from the plasma through a differentially-pumped vacuum interface and travel through a pressurized chamber (CRC) containing a reaction gas which preferentially reacts with interfering ions of the same target mass to charge ratios (m/z). A solid-state detector detects ions transmitted through the mass analyzer and the resulting current is processed by a data handling system.

Retention times for each eluting species are compared to known standards for species identification.

4. Analytical Issues

The overall analyses went well and no significant analytical issues were encountered. All quality control parameters associated with these samples were within acceptance limits.

The estimated method detection limits (eMDLs) for selenite, selenate, and selenocyanate are generated from replicate analyses of the lowest standard in the calibration curve. Not all selenium species are present in preparation blanks; therefore, eMDL calculations based on preparation blanks are artificially biased low.

The eMDL for methylseleninic acid and selenomethionine is calculated from the average eMDL of selenite, selenate, and selenocyanate. The calibration does not contain methylseleninic acid or selenomethionine due to impurities in these standards which would bias the results for other selenium species.

The eMDL for mercury has been calculated using the standard deviation of the preparation blanks preserved and analyzed concurrently with the submitted samples.

The mercury recovery for the matrix spike duplicate performed on the sample identified as Batch QC was above the established control limit of 125% (128.9%). All other quality control parameters were within acceptance limits signifying acceptable instrument performance. Since the variance is isolated to the individual analysis no corrective action was necessary.

If you have any questions or concerns regarding this report, please feel free to contact me.

Sincerely,

A handwritten signature in black ink, appearing to read 'Russell Gerads', with a stylized, cursive script.

Russell Gerads
Vice President
Applied Speciation and Consulting, LLC

Total Mercury & Selenium Speciation Results for Duke Energy

Project Name: Belews - FGD WWTS (Flex Fuel Study)**

Contact: Jay Perkins

LIMS #J13080507

Date: September 9, 2013

Report Generated by: Russell Gerads

Applied Speciation and Consulting, LLC

Sample Results

| Sample ID | Total Hg | Se(IV) | Se(VI) | SeCN | MeSe(IV) | SeMe | Unknown Se Species (n) |
|------------------|----------|------------|------------|------------|------------|------------|------------------------|
| FGD Purge Eff | NR | 152 | 55.5 | ND (<1.5) | 6.7 | ND (<1.3) | 0 (0) |
| BioReactor 1 Inf | 0.248 | 12.3 | 46.7 | ND (<0.36) | 1.90 | ND (<0.33) | 2.13 (1) |
| BioReactor 2 Inf | 0.0645 | NR | NR | NR | NR | NR | NR |
| BioReactor 2 Eff | 0.0120 | ND (<0.24) | ND (<0.39) | ND (<0.36) | ND (<0.33) | ND (<0.33) | 0 (0) |

All results reflect the applied dilution and are reported in µg/L

NR = Analysis not requested

ND = Not detected at the applied dilution

SeCN = Selenocyanate

MeSe(IV) = Methylseleninic acid

SeMe = Selenomethionine

Unknown Se Species = Total concentration of all unknown Se species observed by IC-ICP-MS

n = number of unknown Se species observed

Total Mercury & Selenium Speciation Results for Duke Energy

Project Name: Belews - FGD WWTS (Flex Fuel Study)**

Contact: Jay Perkins

LIMS #J13080507

Date: September 9, 2013

Report Generated by: Russell Gerads

Applied Speciation and Consulting, LLC

Quality Control Summary - Preparation Blank Summary

| Analyte (µg/L) | PBW1 | PBW2 | PBW3 | PBW4 | Mean | StdDev | eMDL* | eMDL 5x | eMDL 250x | eMDL 1000x |
|----------------|--------|--------|--------|--------|--------|--------|--------|---------|-----------|------------|
| Hg | 0.0012 | 0.0006 | 0.0000 | 0.0005 | 0.0006 | 0.0005 | 0.0003 | 0.0015 | - | - |
| Se(IV) | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.001 | - | 0.24 | 0.96 |
| Se(VI) | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.002 | - | 0.39 | 1.6 |
| SeCN | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.001 | - | 0.36 | 1.5 |
| MeSe(IV) | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.001 | - | 0.33 | 1.3 |
| SeMe | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.001 | - | 0.33 | 1.3 |

eMDL = Estimated Method Detection Limit

*Please see narrative regarding eMDL calculations

Quality Control Summary - Certified Reference Materials

| Analyte (µg/L) | CRM | True Value | Result | Recovery |
|----------------|------------|------------|--------|----------|
| Hg | NIST 1641d | 1568 | 1799 | 114.7 |
| Se(IV) | LCS | 4.79 | 4.70 | 98.3 |
| Se(VI) | LCS | 4.74 | 4.50 | 94.8 |
| SeCN | LCS | 4.46 | 4.40 | 98.6 |
| MeSe(IV) | LCS | 3.24 | 2.85 | 88.0 |
| SeMe | LCS | 4.66 | 4.30 | 92.3 |

Total Mercury & Selenium Speciation Results for Duke Energy
 Project Name: Belews - FGD WWTS (Flex Fuel Study)**

Contact: Jay Perkins

LIMS #J13080507

Date: September 9, 2013

Report Generated by: Russell Gerads
 Applied Speciation and Consulting, LLC

Quality Control Summary - Matrix Duplicates

| Analyte (µg/L) | Sample ID | Rep 1 | Rep 2 | Mean | RPD |
|----------------|-----------|-----------|-----------|--------|-----|
| Hg | Batch QC | 0.0132 | 0.0129 | 0.0131 | 2.3 |
| Se(IV) | Batch QC | 312.5 | 289.9 | 301.2 | 7.5 |
| Se(VI) | Batch QC | 65.4 | 66.6 | 66.0 | 1.8 |
| SeCN | Batch QC | ND (<1.5) | ND (<1.5) | NC | NC |
| MeSe(IV) | Batch QC | 6.40 | 6.62 | 6.5 | 3.4 |
| SeMe | Batch QC | ND (<1.3) | ND (<1.3) | NC | NC |

ND = Not detected at the applied dilution

NC = Value was not calculated due to one or more concentrations below the eMDL

Quality Control Summary - Matrix Spike/ Matrix Spike Duplicate

| Analyte (µg/L) | Sample ID | Spike Conc | MS Result | Recovery | Spike Conc | MSD Result | Recovery | RPD |
|----------------|-----------|------------|-----------|----------|------------|------------|----------|-----|
| Hg | Batch QC | 2.000 | 2.470 | 122.8 | 2.000 | 2.591 | 128.9* | 4.8 |
| Se(IV) | Batch QC | 5560 | 6039 | 103.2 | 5560 | 5950 | 101.6 | 1.5 |
| Se(VI) | Batch QC | 5045 | 5204 | 101.8 | 5045 | 5211 | 102.0 | 0.1 |
| SeCN | Batch QC | 4575 | 4570 | 99.9 | 4575 | 4582 | 100.2 | 0.3 |

*The recovery exceeds the established control limit of 125%. Please see narrative.



Duke Energy Analytical Laboratory

Mail Code MGO3A2 (Building 7405)
13339 Hegers Ferry Rd
Huntersville, N. C. 28078
(704) 875-5245
Fax: (704) 879-4349

| | |
|---|-------------------------------|
| 1) Project Name: Belwets - FGD | 2) Phone No.: |
| 3) Client: WWTS (Flex Fuel Study)** | 4) Fax No.: |
| 5) Use Project: WWTS FGD Routine 2013 | 6) Process: BMCEFGD |
| 7) Oper. Unit: BC00 | 8) Res. Type: |
| 9) Mail Code: | 10) Res. Center: |

CHAIN OF CUSTODY RECORD AND ANALYSIS REQUEST FORM

Page 1 of 2
DISTRIBUTION
ORIGINAL TO LAB.
COPY TO CLIENT

| | |
|----------------------------------|---|
| ORDER# 713680507 | ANALYTICAL LABORATORY USE ONLY |
| LOGGED BY 8/28/13 0915 | SAMPLES Originating From: NC SAMPLE PROGRAM: SC Water: Drinking Water Ground: NPDES Drinking Water: UST |
| AS&C PO#650910 | COOLANT TEMP (IG) 1) Phosphorus: 1-HCL 2) H ₂ SO ₄ , 3-HNO ₃ 4) H ₂ O, 5-None |

| | |
|--|--------------------------------|
| 11) Project Name: AS&C | 12) Phone No.: |
| 13) Client: PO#650910 | 14) Fax No.: |
| 15) Use Project: WWTS FGD Routine 2013 | 16) Process: BMCEFGD |
| 17) Oper. Unit: BC00 | 18) Res. Type: |
| 19) Mail Code: | 20) Res. Center: |

| Se Speciation Bottle ID | 13 Sample Description or ID |
|-------------------------|-----------------------------|
| | FGD Purge Eff |
| | EQ Tank Eff. |
| | BioReactor 1 Inf |
| | BioReactor 2 Inf |
| | BioReactor 2 Eff |
| | Filter Blk |
| | Metals Trip Blk |

| LAB USE ONLY |
|--------------|
| 1) Lab ID |
| 2) Lab ID |
| 3) Lab ID |
| 4) Lab ID |
| 5) Lab ID |
| 6) Lab ID |
| 7) Lab ID |
| 8) Lab ID |

| | |
|--|--|
| 1) Requisitioned By 8/27/13 1400 | 2) Accepted By 8/27/13 1400 |
| 3) Requisitioned By 8/28/13 0845 | 4) Accepted By 8/28/13 0845 |
| 5) Requisitioned By 8/28/13 1300 | 6) Accepted By 8/28/13 1300 |
| 7) Requisitioned By 8/28/13 1300 | 8) Accepted By 8/28/13 1300 |
| 9) Seal Lock Opened By 8/28/13 1300 | 10) Seal Lock Opened By 8/28/13 1300 |
| 11) Seal Lock Opened By 8/28/13 1300 | 12) Seal Lock Opened By 8/28/13 1300 |
| Comments | |

Customer, IMPORTANT!
Please indicate desired turnaround.

| |
|--------------------------|
| 22) Requested Turnaround |
| 14 Days |
| 7 Days |
| 48 Hr |
| *Other |
| *Add. Cost Will Apply |
| 9-10-13 |

* B by TRM/JCP As, Cd, Cr, Cu, Ni, Se, Ag, Zn by TRM/JMS 1**=No Hg 245.1

CHAIN OF CUSTODY RECORD AND ANALYSIS REQUEST FORM



Duke Energy Analytical Laboratory

Mail Code MGO3A2 (Building 7405)
13339 Hagers Ferry Rd
Huntersville, N. C. 28078
(704) 875-5245
Fax: (704) 875-4349

Analytical Laboratory Use Only

| | | |
|-------------------------------|------------------------------------|--|
| ORDER# J13080507 | MATRIX: OTHER | Samples Originating From NC _____ SC _____ |
| Logged By RA | Date & Time 8/28/13 0915 | SAMPLE PROGRAM Water _____ Ground NPDES Drinking Water RCRA Waste _____ |
| Cooler Temp (C) 3.0 | | |

Page 16 of 16
Page 1 of 2
DISTRIBUTION
ORIGINAL to LAB,
COPY to CLIENT

AS&C
PO#650910

¹⁵Preserv.: 1=HCL
2=H₂SO₄ 3=HNO₃
4=Ice 5=None

MR #

Customer to complete all
appropriate non-shaded areas.

Sampling conducted: 2nd and 4th Wednesday

| Date | Time | Signature |
|------|------|-----------|
| 8/27 | 0740 | TO |
| 8/27 | 0745 | |
| 8/27 | 0750 | |
| 8/27 | 0800 | |
| 8/27 | 0805 | |
| 8/27 | 0755 | |
| 8/27 | 0735 | |

¹⁶Analyses Required

¹⁷Comp. ¹⁸Grab

TDS

Br (Dionex)

Metals* + Hg 245.1**

Se (IMS), filtered

Hg 200.8 (V_AS&C)

Se, speciation - vendor to AS&C (Important to place filled bottle back into both baggies)

Filtering of the Se is performed in the field please provide a filter blank too.

Return kit to Travis Thorton

| Se Speciation Bottle ID | ¹³ Sample Description or ID |
|-------------------------|--|
| | FGD Purge Eff |
| | EQ Tank Eff. |
| | BioReactor 1 Inf |
| | BioReactor 2 Inf |
| | BioReactor 2 Eff |
| | Filter Blk |
| | Metals Trip Blk |

LAB USE ONLY

¹¹Lab ID

2013020586
2013020587
2013020588
2013020589
2013020590
2013020591
2013020592

Customer to complete appropriate columns to right

| | | | |
|--|----------------------------------|--------------------------------------|----------------------------------|
| 1) Relinquished By [Signature] | Date/Time 8/27/13 1400 | 2) Accepted By COURIER | Date/Time 8/27/13 |
| 3) Relinquished By COURIER | Date/Time 8/28/13 0845 | 4) Accepted By [Signature] | Date/Time 8/28/13 0845 |
| 5) Relinquished By | Date/Time | 6) Accepted By | Date/Time |
| 7) Relinquished By [Signature] | Date/Time 8/28/13 1300 | 8) Accepted By | Date/Time |
| 9) Seal/Locked By [Signature] | Date/Time 8/28/13 1300 | 10) Seal/Lock Opened By | Date/Time |
| 11) Seal/Locked By | Date/Time | 12) Seal/Lock Opened By | Date/Time |

Comments

* B by TRM/ICP As, Cd, Cr, Cu, Ni, Se, Ag, Zn by TRM/IMS 1**=No Hg 245.1

Customer, IMPORTANT!
Please indicate desired turnaround.

²²Requested Turnaround

14 Days _____

*7 Days _____

- 48 Hr _____

*Other _____

* Add. Cost Will Apply

9-10-13